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By-Rahmlow, Harold; And Others

OCCUPATIONAL MATHEMATICS; EQUIVALENT FORMS OF A=BC. REPORT NO. 16-N, BOOKLET II. FINAL REPORT.

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This programed mathematics textbook (Volume II) is for student use in vocational education courses. It was developed as part of a programed series covering 21 mathematical competencies which were identified by university researchers through task analysis of several occupational clusters. The development of a sequential content structure was also based on these mathematics competencies. After completion of this program the student should be able to: (1) recognize a correct equation of the type a=bc, where a, b, c are either letters or positive integers less than 100, (2) recognize equivalent statements of the general equation a=bc, when these statements are obtained by replacement, multiplication, or division, (3) select the correct method (replacement, multiplication, or division) for deriving an equivalent statement from an equation of the form a=bc, (4) demonstrate competency in the previous objectives by correctly answering four out of five multiple choice text items covering each objective. The material is to be used by individual students under teacher supervision. Twenty-six other programed texts and an introductory volume are available as VT 006 882-VT 006 909. (EM)

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BOOKLET II, FINAL REPORT

OF

Report No. 16-N

Occupational Mathematics

EQUIVALENT FORMS OF A = BC.

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Your answer was (b) IR = E. Correct!

If you multiply <u>both</u> sides of the statement $x = y/w$ by w, what do you obtain?

(a) $wx = y$ Turn to page 110 (Book I)

(b) x Turn to page 116

Your answer was (b) x. Not right!

You must multiply <u>both</u> sides of the equation by the same quantity.

$x = y/w$	Original statement
$w \cdot x = w \cdot y/w$	Multiply <u>both</u> sides by w
$wx = y$	New equivalent statement

.

O.K., here we go again.

What quantity would you multiply $b = c/a$ by to obtain $ab = c$?

(a) a	Turn to page 105 (Book I)
(b) b	Turn to page 117

Your answer was (b) b. No!

Maybe it would be good for you to review these ideas using numbers.

Turn to page 45 (Book I).

Your answer was (a) y. No! Did you really mean that?

I thought you had the correct idea.

We began with: x/y

We multiply by y: y . x/y

We obtain: x

Now we'll run through another. What do we obtain if we multiply x/a by a?

(a) a — Turn to page 119

(b) x — Turn to page 107 (Book I)

Your answer was (a) a. Incorrect!

It might help you to quickly review these same ideas using numbers.

Turn to page 45 (Book I).

Your answer was y/x. Incorrect! y/x is y divided by x.

Possibly you misread the question. We said if we divide 3 by 4, we obtain 3/4.

So, if we divide x by y, we should obtain x/y.

You should be able to get back on the track very quickly.

We could represent m divided by n as m ÷ n. What is another way of representing m divided by n?

(a) n/m — Turn to page 122

(b) m/n — Turn to page 121

Your answer was (b) m/n. Very good.

One way to show x divided by y is $x \div y$. What is another way of showing $x \div y$?

(a) x/y — Turn to page 108 (Book I)

(b) y/x — Turn to page 123

Your answer was (a) n/m. No!

Well, let's look over the ideas using numbers.

Turn to page 45 (Book I)

Your answer was y/x. No!

Well, let's look over the ideas using numbers.

Turn to page 45 (Book I)

Your answer was (b) c/b. No, that's not right!

We want to divide b by c. We could show this as either b ÷ c or b/c.

Suppose we want to divide m by n. We could write this as m ÷ n or as _____?

(a) n/m — Turn to page 125

(b) m/n — Turn to page 121

Your answer was (a) n/m. Incorrect!

Well, a little hint might help you.

If we divide y by x, we can write this as $y \div x$.
Another possible way of writing y divided by x is
$y/\square$. What should we have in the $\square$?

(a) x — Turn to page 126

(b) y — Turn to page 1 (Book I)

Your answer was x. Very good!

y divided by x can be represented y $\div$ x or y/x.

How can we show m $\div$ n?

(a) n/m Turn to page 122

(b) m/n Turn to page 121

Your answer was (b) rt = d/t. Incorrect.

Let's go over this once again.

We began with: r = d/t

Multiply <u>both</u> sides by t: t . r = t . d/t

We obtain: tr = d

What do we obtain if we multiply <u>both</u> sides of the equation I = E/R by R?

(a) IR = ER Turn to page 129

(b) IR = E Turn to page 115

Your answer was (a) r = d. Incorrect!

Let's go over this once again.

We began with: r = d/t

Multiply <u>both</u> sides by t: t . r = t . d/t

We obtain: tr = d

What do we obtain if we multiply <u>both</u> sides of the equation I = E/R by R?

(a) IR = ER Turn to page 129

(b) IR = E Turn to page 115

Your answer was (a) IR = ER. No, not quite!

Let's start a little simpler and work up.

What do we obtain as a result if we multiply x/y by y?

(a) y — Turn to page 118

(b) x — Turn to page 107 (Book I)

Your answer was IR = E/R. Incorrect!

Let's start a little simpler and work up.

What do we obtain as a result if we multiply x/y by y?

(a) y — Turn to page 118

(b) x — Turn to page 107 (Book I)

Your answer was (b) No. Incorrect!

The question we are really asking is this: Is RI = IR? Does the order of multiplication affect the result?

Here is a numerical example:

The result of 3 multiplied by 2 is 6: 3 x 2 = 6

The result of 2 multiplied by 3 is 6: 2 x 3 = 6

So, we can say 3 x 2 = 2 x 3.

Is the result of 5 x 4 the same as the result of 4 x 5?

(a) Yes Turn to page 132

(b) No Turn to page 134

Your answer was (a) Yes. Very good!

Expressions like 5 x 4 = 4 x 5 and m . n = n . m are correct statements because of the COMMUTATIVE LAW of multiplication. The COMMUTATIVE LAW of multiplication simply says that the order of multiplication does not affect the result.

Another example of the COMMUTATIVE LAW is t x r = r x t.

What equation would be equivalent to E = IR?

(Remember, the commutative law of multiplication)

(a) R = IE — Turn to page 133

(b) I = RE — Turn to page 133

(c) E = RI — Turn to page 25 (Book I)

Your answer was either (a) R = IE or (b) I = RE.

No!

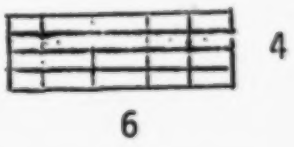
Maybe you should concentrate a little more on the COMMUTATIVE LAW.

Go to Unit 16 on the COMMUTATIVE LAW.

When you have finished Unit 16, return to the beginning of this unit.

Your answer was (b) No. Incorrect! Maybe a more real life example would help.

We want to know the area of a plot of ground which is 6 feet long and 4 feet wide.



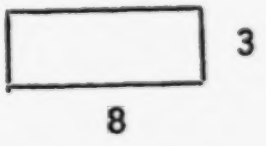
You probably remember that the area is the product of the length and width

AREA = LENGTH x WIDTH = 6 feet x 4 feet = 24 square feet

or

AREA = WIDTH x LENGTH = 4 feet x 6 feet = 24 square feet

We have the problem of determining the area of a plot of ground which is 8 feet long and 3 feet wide.



AREA = LENGTH x WIDTH = 8 feet x 3 feet = 24 square feet

Are we correct to do the problem this way?

AREA = WIDTH x LENGTH = 3 feet x 8 feet = 24 square feet

(a) Yes Turn to page 135

(b) No Turn to page 136

Your answer was (a) Yes. Good!

The commutative law tells us the order of multiplication does not change the result.

Is the result of 5 x 4 equal to the result of 4 x 5?

(a) Yes Turn to page 132

(b) No Turn to page 136

Your answer was (b) No. Incorrect!

Maybe you should concentrate a little more on the commutative law.

Go to Unit 16 on the COMMUTATIVE LAW.

When you have finished Unit 16, return to the beginning of this unit.

Your answer was (a) Yes. Very good!

Sometimes it takes more than one step to form an equivalent statement. For example, we want to show that the statement a/b = c is equivalent to the statement a/c = b.

$a/b = c$	original statement
$b \cdot a/b = b \cdot c$	Multiply by b
$a = bc$	
$\frac{a}{c} = \frac{bc}{c}$	Divide by c
$a/c = b$	Equivalent statement

In this problem we had to multiply and divide to produce the equivalent statement.

Suppose we want to show that 15/3 = 5 is equivalent to 15/5 = 3.

$15/3 = 5$	Original statement
$3 \cdot 15/3 = 3 \times 5$	Multiply by 3
$15 = 3 \times 5$	
$15/5 = \frac{3 \times 5}{5}$	Divide by 5
$15/5 = 3$	New equivalent statement

(continue on next page)

Is the statement 12/4 = 3 equivalent to the statement 12/3 = 4?

(a) Yes Turn to page 138

(b) No Turn to page 152

Your answer was (a) Yes. Correct!

Here is the way you should have found your correct answer:

$12/4 = 3$	Original statement
$4 \times 12/4 = 4 \times 3$	Multiply by 4
$12 = 4 \times 3$	
$\frac{12}{3} = \frac{4 \times 3}{3}$	Divide by 3
$12/3 = 4$	New equivalent statement

Is the statement $15/3 = 5$ equivalent to the statement $3/15 = 5$?

(a)	Yes	Turn to page 150
(b)	No	Turn to page 139

Your answer was (b) No. Correct.

Very good: 3/15 = 5 is not a correct statement.

Is a/b = c equivalent to the statement a/c = b?

(a) Yes Turn to page 140

(b) No Turn to page 148

Your answer was (a) Yes. Very good!

Here is the work for the last problem:

a/b = c	Original statement
a = bc	Multiply by b
a/c = b	Divide by c

Suppose we begin with the statement 20/4 = 5. We form the equivalent statement 20 = 4 x 5. What operation did we perform on the original statement to obtain the final equivalent statement?

(a) multiply by 5 Turn to page 181

(b) multiply by 4 Turn to page 142

(c) divide by 5 Turn to page 181

(d) divide by 4 Turn to page 181

Let's try another one.

Suppose we begin with the statement 20/4 = 5. We form the equivalent statement 20 = 5 x 4. What operation did we perform on the original statement to obtain the final equivalent statement?

(a) Multiply by 5 Turn to page 181

(b) Multiply by 4 Turn to page 142

(c) Divide by 5 Turn to page 181

(d) Divide by 4 Turn to page 181

Your answer was (b) multiply by 4. Good! You are correct.

Suppose we have:

a = bc	Original statement
a/b = c	New equivalent statement

What operation was performed on the original statement to form the new equivalent statement?

(a) multiply by b Turn to page 181

(b) divide by a Turn to page 181

(c) divide by b Turn to page 143

(d) divide by c Turn to page 181

Your answer was (c) divide by b. Very good!

Here's another:

15/5 = 3	Original statement
15/3 = 5	Equivalent statement

What operation was done to the original statement to produce the equivalent statement?

(a)	multiply by 5	Turn to page 178
(b)	divide by 3	Turn to page 178
(c)	multiply by 5 and divide by 3	Turn to page 144
(d)	multiply by 3 and divide by 5	Turn to page 185

Your answer was (c) multiply by 5 and divide by 3.

Correct. You are really going now!

I = E/R	Original statement
R = E/I	Equivalent statement

What was done to the original statement to produce the equivalent statement?

(a)	multiply by R	Turn to page 179
(b)	divide by I	Turn to page 179
(c)	multiply by I and divide by R	Turn to page 145
(d)	multiply by R and divide by I	Turn to page 220

Your answer was: multiply by I and divide by R.

Incorrect. You almost had it! Maybe you weren't quite careful enough.

The original statement was I = E/R.

We want to obtain the equivalent statement R = E/I.

I = E/R	Original statement
R x I = E	Multiply by R
R = E/I	Divide by I

Try this one very carefully. What was done to the original statement I = R/E to obtain the equivalent statement E = R/I?

(a) multiply by E and divide by I Turn to page 146

(b) multiply by I and divide by E Turn to page 147

Your answer was (a) multiply by E and divide by I.

Very good!

I = R/E	Original statement
E x I = R	Multiply by E
E = R/I	Divide by I

What is the operation performed on the statement

m = jb to obtain the equivalent statement m/b = j?

(a) divide by j Turn to page 181

(b) multiply by b Turn to page 181

(c) divide by b Turn to page 143

Your answer was (b) multiply by I and divide by E.

Incorrect.

You seem to be getting multiplication and division confused. Let's try using numbers again. Suppose we begin with the original statement 24/4 = 6. We obtain an equivalent statement 24 = 4 x 6.

What operation was performed on the original statement to form the equivalent statement?

(a) divide by 4 Turn to page 47 (Book I)

(b) multiply by 4 Turn to page 142

Your answer was (b) No. Incorrect. They are equivalent!

We wanted to know whether a/b = c was equivalent to the statement a/c = b. We could take a/b = c and multiply by b and divide by c to produce a/c = b.

a/b = c	Original statement
a = bc	Multiply by b
a/c = b	Divide by c

Try this one. Can we change c/d = e to c/e = d by multiplying c/d = e by d and then dividing this result by e?

(a)	Yes	Turn to page 149
(b)	No	Turn to page 165

Your answer was (a) Yes. Correct, very good!

c/d = e can be multiplied by d and divided by e to form c/e = d.

Is the statement a/b = c equivalent to the statement a/c = b?

(a) Yes Turn to page 140

(b) No Turn to page 176

Your answer was (a) Yes. Wrong!

Now really, I don't think you read the problem correctly! Is 15/3 = 5 equivalent to the statement 3/15 = 5? Of course not! 3/15 = 5 is an incorrect statement.

Here, try this one:

Is 10/2 = 5 equivalent to the statement 2/10 = 5.

(a) Yes Turn to page 154

(b) No Turn to page 151

Your answer was (b) No. Correct!

Again, 2/10 = 5 is not even a correct statement!

Is 15 = 5 x 3 equivalent to the statement 3/15 = 5?

(a) Yes Turn to page 154

(b) No Turn to page 139

Your answer was (b) No. Incorrect!

Maybe you did not read the question correctly. The question was: Is the statement 12/4 = 3 equivalent to the statement 12/3 = 4? The answer is yes.

12/4 = 3	Original statement
12 = 4 x 3	Multiply by 4
12/4 = 3	Divide by 3

Using both multiplication and division, we obtain the equivalent form.

Try this one: Is 8/2 = 4 equivalent to the statement 8/4 = 2?

(a)	Yes	Turn to page 153
(b)	No	Turn to page 174

Your answer was (a) Yes. Very good, you are correct!

An example of the method of multiplying and dividing to produce an equivalent statement is:

8/2 = 4	Original statement
8 = 2 x 4	Multiply by 2
8/4 = 2	Divide by 4

Here is another:

Is the statement 10/2 = 5 equivalent to the statement 2/10 = 5?

(a)	Yes	Turn to page 154
(b)	No	Turn to page 151

Your answer was (a) yes. Incorrect! Maybe you should have some kind of a check list to use.

If you are dealing with numbers, the first step is to see if the statement is correct.

For example, take the statement 2/10 = 5. This is not correct! When we divide 2 by 10, we do not obtain 5.

How about this one.

Is 6/3 = 2 equivalent to the statement 3/6 = 2?

(a) Yes Turn to page 155

(b) No Turn to page 156

Your answer was (b) yes. Incorrect!

You should tell your teacher of the difficulty you are having.

After you have seen your teacher, begin on page 7, (Book I).

Your answer was (b) no. Very good!

Is the statement 8 = 4 x 2 equivalent to the statement 2/8 = 4?

(a) Yes — Turn to page 155

(b) No — Turn to page 157

Your answer was (b) no. Correct!

You have the correct idea. When dealing with numbers or letters, your first step is to see if both statements are correct. Your next step should be to see if both original statements can be changed to the same new statement by either multiplication or division.

Is the statement 16/4 = 4 equivalent to the statement 9/3 = 3?

(a) Yes Turn to page 161

(b) No Turn to page 158

Your answer was (b) no. Correct, very good!

16/4 is a correct statement and 9/3 = 3 is a correct statement. But one cannot be obtained from the other by multiplication or division.

Let's try this one.

Is 12/4 = 3 equivalent to 15/3 = 5?

(a) Yes Turn to page 160

(b) No Turn to page 159

Your answer was (b) no. Very good!

You probably recognized that even if 15/3 = 5 is a correct statement, it cannot be obtained from 12/4 = 3 by multiplication or division.

Is the statement 12/4 = 3 equivalent to the statement 12/3 = 4?

(a) Yes Turn to page 138

(b) No Turn to page 152

Your answer was (a) yes. Incorrect! We wanted to know whether 12/4 = 3 is equivalent to 15/3 = 5.

Well, 15/3 = 5 is a correct statement. So, it passes the first check.

Now, can we change 12/4 = 3 and 15/3 = 5 into the same statement by multiplication or division? No!

If we multiply 12/4 = 3 by 4, we obtain 12 = 4 x 3.

If we multiply 15/3 = 5 by 3, we obtain 15 = 5 x 3.

Obviously, these two statements are not the same.

Try this one.

Is 18/2 equivalent to the statement 14/2 = 7?

(a) Yes Turn to page 164

(b) No Turn to page 162

Your answer was (a) yes. No, that's not right!

We wanted to know whether 16/4 = 4 is equivalent to 9/3 = 3.

Well, 9/3 = 3 is a correct statement. So, it passes the first check.

Now, can we change 16/4 = 4 and 9/3 = 3 into the same statement by multiplication or division? No!

Try this one.

Is 18/2 = 9 equivalent to the statement 14/2 = 7?

(a) Yes Turn to page 164

(b) No Turn to page 162

Your answer was (b) no. Very good!

Is the statement 12/4 = 3 equivalent to the statement 15/3 = 5?

(a) Yes Turn to page 163

(b) No Turn to page 159

Your answer was (a) Yes. Incorrect!

Now really, you can never change both 12/4 = 3 and 15/3 = 5 to the same statement by either multiplication or division.

You need a change. Turn to page 45 (Book I).

Your answer was (a) yes. No, that's not right!

It is true that 14/2 = 7 is a correct statement. However, no multiplication or division can change 18/2 = 9 to 14/2 = 7.

Be careful!

Is 9/3 = 3 equivalent to the statement 4/2 = 2?

(a) Yes Turn to page 163

(b) No Turn to page 162

Your answer was (b) no. Incorrect!

Maybe you didn't quite understand the question. Can we change c/d = e to c/e = d by multiplying c/d = e by d and then dividing this result by e Yes, we can. Here's how:

c/d = e	Original statement
c = d x e	Multiply by d
c/e = d	Divide by e

Remember we can multiply both sides of the equation by the same quantity and divide both sides of the equation by the same quantity.

We want to change m/n = p to the equivalent statement m/p = n. First, we will multiply m/n = p by n. What do we do to the result to obtain m/p = n?

(a) multiply by n Turn to page 173

(b) multiply by p Turn to page 173

(c) divide by n Turn to page 173

(d) divide by p Turn to page 167

Your answer was (a) multiply by R or (b) divide by I.

Incorrect!

Maybe you don't quite understand this type of question. Let's look at another example. Can we change c/d = e to c/e = d by multiplying c/d = e by d and then dividing this result by e Yes, we can. Here's how:

c/d = e	Original statement
c = d x e	Multiply by d
c/e = d	Divide by e

Remember, we can multiply both sides of the equation by the same quantity and divide both sides of the equation by the same quantity.

We want to change m/n = p to the equivalent statement m/p = n. First, we will multiply m/n = p by n. What do we do to the result to obtain m/p = n?

(a)	multiply by n	Turn to page 173
(b)	multiply by p	Turn to page 173
(c)	divide by n	Turn to page 173
(d)	divide by p	Turn to page 167

Your answer was (d) divide by p. Very good!

We began with: m/n = p Original statement

m = p x n Multiply by n

m/p = n Divide by p

Now, we want to change p/m = n to the equivalent statement p/n = m. We want to first multiply and then divide. We should:

(a) multiply p/m = n by n and then divide the result by m to obtain p/n = m Turn to page 170

(b) multiply p/m = n by m and then divide the result by n to obtain p/n = m Turn to page 168

Your answer was (b) multiply p/m = n by m and then divide the result by n to obtain p/n = m. Correct!

You really have it now!

Can we change c/d = e to c/e = d by multiplying c/d = e by d and then dividing the result by e?

(a) Yes Turn to page 149

(b) No Turn to page 169

Your answer was (b) no. Incorrect!

Too bad, I thought you had it for sure. Maybe we should go through the last few examples again. I'm sure you'll get it.

We wanted to change from c/d = e to the equivalent statement c/e = d.

c/d = e	Original statement
c = d x e	Multiply by d
c/e = d	Divide by e

Now: Can we in fact obtain the equivalent statement c/e = d from the original statement c/d = e by multiplying the original statement c/d = e by d and then dividing the result by e?

(a) Yes Turn to page 149

(b) No Turn to page 165

Your answer was (a) multiply p/m = n by n and then divide the result by m to obtain p/n = m. No, that's not right!

Here's what should be done:

p/m = n Original statement

multiply p/m = n by m to obtain p = m . n

divide p = m . n by n to obtain p/n = m

Can we obtain I = E/R from R = E/I by first multiplying R = E/I by I and then dividing the result by R?

(a) Yes Turn to page 171

(b) No Turn to page 172

Your answer was (a) yes. Very good!

R = E/I	Original statement
I x R = E	Multiply by I
I = E/R	Divide by R

Can we in fact obtain the equivalent statement c/e = d from the original statement c/d = e by multiplying the original statement c/d = e by d and then dividing the result by e?

(a)	Yes	Turn to page 149
(b)	No	Turn to page 165

Your answer was (b) no. Incorrect!

You seem to be behaving much like a yo-yo. Up--Down--Up--Down. Let's see if you can break the habit.

Turn to page 177.

Your answer was either (a) multiply by n, (b) multiply by p, or (c) divide by n. Incorrect.

Possibly you misread the question. We began with the original statement m/n = p.

We multiplied m/n = p by n and should obtain m = p x n. Then, we should divide m = p x n by p to obtain m/p = n.

Now, we want to change p/m = n to the equivalent statement p/n = m. We want to first multiply and then divide. We should:

(a) multiply p/m = n by n and then divide the result by m to obtain p/n = m Turn to page 170

(b) multiply p/m = n by m and then divide the result by n to obtain p/n = m Turn to page 168

Your answer was (b) no. Incorrect!

The statement 8/2 = 4 is equivalent to the statement 8/4 = 2.

Here's how we know:	8/2 = 4	Original statement
multiply 8/2 = 4 by 2	8 = 2 x 4	
then divide by 4	8/4 = 2	

The two statements are equivalent because one can be obtained from the other by multiplication and division.

So: Can we say that 8/4 = 2 and 8/2 = 4 are equivalent statements?

(a) Yes — Turn to page 153

(b) No — Turn to page 175

Your answer was (b) no. Incorrect!

Your human teacher can probably help you. See the teacher and then start Book I again. I'm sure you won't have any difficulty next time.

Your answer was (b) no. Incorrect!

Maybe we should try a problem with numbers.

Remember, we can both multiply and divide to obtain equivalent statements.

Is the statement 12/4 = 3 equivalent to the statement 12/3 = 4?

(a) Yes Turn to page 138

(b) No Turn to page 152

Maybe we should try a problem with numbers.

Remember, we can both multiply and divide to obtain equivalent statements.

Is the statement 12/4 = 3 equivalent to the statement 12/3 = 4?

(a) Yes Turn to page 138

(b) No Turn to page 152

Your answer was either (a) multiply by 5 or (b) divide by 3. Wrong!

It is true that you do complete the operation you mentioned. However, that is only half the job. Here is an example:

$15/5 = 3$	Original statement
$15 = 5 \times 3$	Multiply by 5
$\frac{15}{3} = \frac{5 \times 3}{3}$	Divide by 3
$15/3 = 5$	Equivalent statement

Here is one for you:

$14/2 = 7$	Original statement
$14/7 = 2$	Equivalent statement

If we first multiply the original statement by 2, what else must we do to obtain the equivalent statement?

(a)	nothing	Turn to page 181
(b)	divide by 7	Turn to page 180

Your answer was either (a) multiply by R or (b) divide by I. Wrong!

It is true that you complete the operation you mentioned. However, that is only half the job. Look at this example:

How do we change m/n = p to m/p = n?

m/n = p	Original statement
m = n x p	multiply by n
	half finished
m/p = n	Divide by p

How do we go from I = E/R to R = E/I?

(a) multiply by R — Turn to page 166

(b) divide by I — Turn to page 166

(c) multiply by R and divide by I — Turn to page 220

Your answer was (b) divide by 7. Correct!

To obtain 14/7 = 2 from 14/2 = 7, we must both multiply 14/2 = 7 and divide this result by 7.

Try this:

20/4 = 5	Original statement
20/5 = 4	Equivalent statement

Two operations must be performed to change the original statement to the equivalent statement. One operation is divide by 5. What is the other?

(a) divide by 4 Turn to page 181

(b) multiply by 4 Turn to page 142

Your answer was incorrect! You almost had it. With a couple of examples I'm sure you will be back on the track.

We will begin with the original statement 18/6 = 3. We would like to form the equivalent statement 18 = 6 x 3. How can we do it? The right side of the original statement is 3. The right side of the equivalent statement is 6 x 3. So, the 3 has been multiplied by 6. But, remember we must do the same thing to <u>both</u> sides of the equation.

18/6 = 3	Original statement
6 x 18/6 = 6 x 3	Multiply by 6
18 = 6 x 3	Equivalent statement

Suppose we begin with the original statement I = E/R. We want to form the equivalent statement I x R = E. We see that the left side of the original statement has been multiplied by R to obtain the left side of the equivalent statement. <u>Both</u> sides must have been multiplied by R!

I = E/R	Original statement
I x R = E/R x R	Multiply by R
I x R = E	

(continued on next page)

Suppose we begin with the statement 15/3 = 5. We want to form the equivalent statement 15 = 3 x 5. We should multiply both sides of the original statement by _____.

(a) 5 Turn to page 183

(b) 3 Turn to page 182

Your answer was (b) 3. Very good, you are right!

15/3 = 5	Original statement
3 x 15/3 = 3 x 5	Multiply by 3
15 = 3 x 5	Equivalent statement

If we have the problem:

8/4 = 2	Original statement
8 = 4 x 2	Equivalent statement

What operation do we perform on the original statement to obtain the equivalent statement?

(a)	divide by 4	Turn to page 184
(b)	multiply by 4	Turn to page 142

Your answer was (a) 5. No!

Oh, well, win some--loose some.

Go and tell your human teacher about your difficulties.

After receiving some assistance, return to page 141.

See you later.

Your answer was (a) divide by 4. No!

Oh, well, win some--loose some.

Go and tell your human teacher about your difficulties.

After receiving some assistance, return to page 141.

See you later.

Your answer was (d) multiply by 3 and divide by 5. No!

Now, really, you must be careful.

15/5 = 3	Original statement
15 = 3 x 5	Multiply by 5
15/3 = 5	Divide by 3

Suppose we begin with I = R/E. We want to obtain the equivalent statement E = R/I. We should:

(a)	multiply by E and divide by I	Turn to page 146
(b)	divide by I	Turn to page 179
(c)	HELP!	Turn to page 181

Your answer was (a) yes. Correct!

You have really done well. You know that an equation such as E = I . R has three equivalent forms.

(E = I . R) (I = E/R) (R = E/I)

Congratulations! I will be looking for you again later.

Good bye.

If I take the equation 12 = 3 + 7 + 2 and replace 7 + 2 by 9, its equal, the resulting equation, 12 = 3 + 9, is said to be equivalent to the first. Whenever I take an equation and replace a number or a quantity by an equal number or quantity, the result is called an equivalent equation. Here are a few more examples:

28 = 7 x 4 is equivalent to 28 = 7 x 2 x 2 since 4 was replaced by 2 x 2. Obviously, 4 = 2 x 2.

6 = 5 + 4/4 is equivalent to the equation 6 = 5 + 1 since 4/4 = 1.

Which equation below is equivalent to the equation 8 x 2 = 16?

(a) 8 x 4/2 = 16 Turn to page 188

(b) 8 x 2/2 = 16 Turn to page 191

Your answer was 8 x 4/2 = 16. Very good! You recognized that 4/2 = 2 as 8 x 2 = 16 is equivalent to 8 x 4/2 = 16.

Which of the following equations is equivalent to a = b · c/c? (Remember, that letters just stand for numbers.)

(a) a = b . c — Turn to page 200

(b) a = b — Turn to page 189

(c) I am not sure what the question means
Turn to page 207

Your answer was correct! You recognized that 1 can be written in many forms. For example, $\frac{c}{c} = 1$, $\frac{6}{6} = 1$.

Turn to page 190.

If I add 3 to both sides of the equation 5 + 2 = 7, the resulting equation 5 + 2 + 3 = 7 + 3 is said to be equivalent to the equation 5 + 2 = 7. I would also obtain equivalent equations if we would subtract, multiply, or divide both sides by 3. This can be done with 3 or any other number we might wish to choose. This can be done with any equation as long as we use the same number with both sides of the equation. One relationship between 2, 5, and 10 is shown by the equation 10/5 = 2. If we multiply both sides by 5, we obtain the equivalent equation 10 = 2 x 5. The equations F = m . a and F/m = a are equivalent. The reason they both are equivalent is because if we divide both sides of the first by m, we get the second equation. On the other hand, multiply both sides of the second equation by m and get the first equation.

Which of the following statements is equivalent to the equation 12 = 4 x 3?

(a) 12/4 = 3 Turn to page 3 (Book I)

(b) 12 = 4 x 3/3 Turn to page 29 (Book I)

Your answers are not correct. Let's find out why.

Remember that if you replace a number by its equal, you obtain an equivalent equation. 2 = 4/2; therefore, 8 x 2 = 16 is equivalent to 8 x 4/2 = 16 since 2 was replaced by 4/2.

Here is another example. The equation 3 x 7 = 21 is equivalent to the equation 6/2 x 7 = 21 since 3 = 6/2 and 3 was replaced by 6/2.

Which statement is equivalent to the equation 4 x 5 = 20?

(a) 4/2 x 5 = 20 Turn to page 194

(b) 4 x 10/2 = 20 Turn to page 193

Your answer was (a) 5 x 2 = 10. Correct!

Keep in mind the idea that if you replace a number by its equal, you obtain an equivalent equation. 2 = 4/2; therefore, 8 x 2 = 16 is equivalent to 8 x 4/2 = 16 since 2 was replaced by 4/2.

Which statement is equivalent to the equation 4 x 5 = 20?

(a) 4/2 x 5 = 20 Turn to page 194

(b) 4 x 10/2 = 20 Turn to page 193

Your answer was 4 x 10/2 = 20. Good! 5 = 10/2 and you replaced 5 by its equal. (equivalent)

Which statement is equivalent to the equation 6 = 2 x 3?

(a) 6 = 14/7 x 3 Turn to page 229

(b) 6 = 2/2 x 3 Turn to page 195

Your answer was 4/2 x 5 = 20. This is not correct.

Try this question.

Which statement is equivalent to 4 x 1 = 4?

(a) 4 x 3/3 = 4 Turn to page 199

(b) 4 x 2 = 4 Turn to page 197

Your answer was 6 = 2/2 x 3. This is not correct.

Try this question.

Which statement is equivalent to 4 x 1 = 4?

(a) 4 x 3/3 = 4 Turn to page 199

(b) 4 x 2 = 4 Turn to page 197

Ready for another try?

Try this one.

Which statement is equivalent to 4 x 1 = 4?

(a) 4 x 3/3 = 4 Turn to page 199

(b) 4 x 2 = 4 Turn to page 197

Your answer was 4 x 2 = 4. Incorrect. Study the following examples carefully.

2 x 7 = 14 is equivalent to 6/3 x 7 = 14 since 2 = 6/3.

6 x 1 = 6 is equivalent to 6 x 5/5 = 6 since 1 = 5/5.

3 x 4 = 12 is equivalent to 3 x 4 = 6 x 2 since 12 = 6 x 2.

Now try this question.

Which statement is equivalent to 5 x 8/4 = 10?

(a) 5 x 2 = 10 Turn to page 192

(b) 5/5 x 8/4 = 10 Turn to page 201

(c) I am not sure I understand Turn to page 201

Your answer was 3 x 6/2 = 3. Incorrect!

Study the following examples carefully.

2 x 7 = 14 is equivalent to 6/3 x 7 = 14 since 2 = 6/3.

6 x 1 = 6 is equivalent to 6 x 5/5 = 6 since 1 = 5/5.

3 x 4 = 12 is equivalent to 3 x 4 = 6 x 2 since 12 = 6 x 2.

Now try this question.

Which statement is equivalent to 5 x 8/4 = 10?

(a) 5 x 2 = 10 Turn to page 192

(b) 5/5 x 8/4 = 10 Turn to page 201

(c) I am not sure I understand Turn to page 201

Your answer was 4 x 3/3 = 4. Very good! You replaced 1 by 3/3.

To make sure you have the correct idea, try this question.

Which statement is equivalent to the equation 3 = 3?

(a) 3 x 6/2 = 3 Turn to page 198

(b) 3 x 5/5 = 3 Turn to page 230

Your answer was a = bc. This is not correct.

Since letters just represent numbers, let's work at an example with numbers. The equation 5 = 5 x 3/3 is equivalent to 5 = 5 since 3/3 = 1. If c represents a non-zero number, then c/c = 1. Therefore, if you replace c/c by 1, the equation a = b x c/c is equivalent to a = b x 1. Since b x 1 is equal to b, then a = b.

Turn to page 206.

Your answer was (b) 5/5 x 8/4 = 10, or (c) I am not sure I understand.

Perhaps you could use some human attention. Why don't you tell your teacher where you are in the program and then return to page 196.

Your answer was a/a . b = c. Correct!

Which of the following equations is equivalent to

a . c/c = b?

(a) a = b Turn to page 189

(b) b = c Turn to page 203

Your answer was not correct. Let's look at some more examples with numbers.

The equation 7 = 7 is equivalent to 7 x 4/4 = 7 since 4/4 = 1.

The equation 6 x 9/9 = 6 since 9/9 = 1.

Now, let's try page 206 once more.

Your answer was b = c. This is not correct. Let's look at some more examples with numbers.

The equation 7 = 7 is equivalent to 7 x 4/4 = 7 since 4/4 = 1.

The equation 6 x 9/9 = 6 since 9/9 = 1.

Now, let's try page 206 once more.

Your answer was 8 x 2/2 = 16. This is not correct.

Turn to page 191.

Let's try this one!

Which equation is equivalent to b = c?

(a) ab = c Turn to page 203

(b) a/a x b = c Turn to page 202

Your answer was (c) I am not sure what the question means.

If we replace a number of quantity by its equal, we obtain an equivalent equation. Can we replace a quantity by its equal in the equation a = b x c/c? Well, we know that c/c = 1; therefore, we can replace c/c by 1 and obtain the equivalent equation a = b x 1. But this is the same as a = b since b x 1 is the same as b.

Turn to page 206.

You are doing very well.

It is important for you to recognize different correct forms of an equation.

If you have a problem in which you must multiply and divide, it does not matter whether you first multiply and then divide or first divide and then multiply.

For example: $\frac{5 \times 4}{4}$ can be done as follows

20/4	multiply 5 x 4 to get 20
5	thus divide 20 by 4 to get 5

or

$\frac{5 \times 4}{4}$	can be done as follows
5 x 4/4	shows we are first going to divide 4 by 4
5 x 1	5 divided by 4 is one
5	multiply 5 x 1 to obtain 5

(continued on next page)

Try this one.

Solve the problem $\frac{6 \times 2}{2}$ by first dividing and then multiplying. Our first step would be to write $6 \times 2/2$.

What does $6 \times 2/2$ equal?

(a) 6×1 Turn to page 209

(b) 6×2 Turn to page 212

Your answer was (a) 6 x 1. Very good!

Of course, 6 x 1 = 6 so the answer to the problem $\frac{6 \times 2}{2}$ is 6.

Since letters as used in mathematics only represent numbers, we may do the same operations with letters that we do with numbers.

For example: $\frac{a \times b}{b}$ can be simplified as follows

a x b/b	shows we are first going to divide b by b
a x 1	b divided by b is one
a	a multiplied by 1 is a

b/b = 1 since b represents any number (except 0: NEVER DIVIDE BY ZERO). If b = 3,

b/b = 3/3 and 3/3 = 1.

Now you do one:

$\frac{a \times m}{m}$ can be written a x m/m which shows we are dividing m by m.

What is a x m/m equal to?

(a) a	Turn to page 210
(b) a x m	Turn to page 214

Your answer was (a) a. Very good!

$\frac{a \times m}{m}$ can be written a x m/m. Since m/m = 1, we have the result a x 1 = a.

So, we see that $\frac{a \times m}{m} = a \times m/m$

and likewise $\frac{5 \times 4}{4} = 5 \times 4/4$

Here is one more example: $\frac{R \times E}{R} = R/R \times E.$

What is another way to write $\frac{R \times E}{R}$?

(a) 1 x E Turn to page 211

(b) R x E Turn to page 216

Your answer was (a) 1 x E. Very good!

You will need to keep the idea in mind. Remember the idea $\frac{a \times b}{b} = a \times b/b$,

and $a \times b/b = a \times 1$

which equals a

Now, turn to page 187 and keep up the good work.

Your answer was (b) 6 x 2. Incorrect!

Let us examine the problem more closely:

$\frac{6 \times 2}{2}$ can be written 6 x 2/2. This is because it does not make any difference whether we first multiply 6 by 2 and then divide by 2 or whether we divide 2 by 2 and then multiply by 6.

If we have 6 x 2/2, we know 2/2 = 1 by division. Since 2/2 = 1, we may substitute 1 for 2/2 and obtain 6 x 2/2 = 6 x 1.

If 3/3 = 1, what is another way to write 5 x 3/3?

(a) 5 x 1 Turn to page 213

(b) 5 x 3 Turn to page 219

Your answer was (a) 5 x 1. Correct! 5 x 1 = 5 x 3/3.

If we began with $\frac{5 \times 3}{3}$, we could write this as 5 x 3/3 or as 5 x 1.

Try this one.

We know $\frac{6 \times 2}{2}$ = 6 x 2/2. What would be another way of writing $\frac{6 \times 2}{2}$?

(a) 6 x 1 Turn to page 209

(b) 6 x 2 Turn to page 212

Your answer was (a) a x m. No, that's not right.

We began with $\frac{a \times m}{m}$ and said it could be written a x m/m. Now look at m/m. Remember, we may use letters to represent any numbers.

If we let m = 2, we have m/m = 2/2 and we know 2/2 = 1.

If we let m = 7, we have m/m = 7/7 and we know 7/7 = 1.

Remember we can never divide by 0 so m cannot be 0 in this problem.

Since m could represent any number in our problem, except 0, we know m/m always equals 1.

If m/m = 1, what is another way of writing a x m/m?

(a) a x m Turn to page 218

(b) a x 1 Turn to page 215

Your answer is (b) a x 1. Very good!

What now would be another way to write $\frac{a \times m}{m}$?

(a) a — Turn to page 210

(b) m — Turn to page 219

Your answer was (b) R x E. Incorrect! Oh dear! I thought you had it.

Remember, you said that $\frac{a \times m}{m} = a \times m/m$ and $a \times m/m = a \times 1$.

Now we want to know another way of representing $\frac{R \times E}{R}$.

How can we represent $\frac{R \times E}{R}$?

(a) 1 x E Turn to page 211

(b) 1 x R Turn to page 217

Your answer was (b) 1 x R. Incorrect! Maybe you need a little more practice using numerals.

Any number divided by itself produces 1. (EXCEPT, NEVER DIVIDE BY 0).

$$4/4 = 1$$

$$5/5 = 1$$

$$100/100 = 1$$

Now 3/3 = 1, so what is another way we could write 5 x 3/3?

(a) 5 x 1 Turn to page 213

(b) 5 x 3 Turn to page 219

Your answer was (a) a x m. Incorrect! Come on now: m/m = 1. We can replace m/m in an equation by whatever it is equal to.

For example: k x m/m = k x 1

What is another way of writing a x m/m?

(a) K x 1 Turn to page 219

(b) a x 1 Turn to page 215

HELP

Go tell your teacher where you are having trouble.

After she has helped you, return to page 1 (Book I).

Your answer was (d) multiply by R and divide by I.

Correct!

Which of the following statements is equal to E = IR?

(a) I = R/E Turn to page 224

(b) R = I/E Turn to page 224

(c) R = E/I Turn to page 221

(d) I = E/R Turn to page 222

Your answer was (c) R = E/I. Very good!

Is R = E/I also equivalent to I = E/R?

(a) Yes Turn to page 186

(b) No Turn to page 223

Your answer was (d) I = E/R. Very good!

Is I = E/R also equivalent to E/I = R?

(a) Yes — Turn to page 186

(b) No — Turn to page 223

Your answer was (b) No. Incorrect!

Remember to change from one statement to an equivalent statement, you sometimes must both multiply and divide.

Now, we want to change p/m = n to the equivalent statement p/n = m. We want to first multiply and then divide. We should:

(a) multiply p/m = n by n and then divide the result by m to obtain p/n = m Turn to page 170

(b) multiply p/m = n by m and then divide the result by n to obtain p/n = m Turn to page 168

Your answer was either (a) I = R/E or (b) R = I/E.

Incorrect!

We began with E = IR.

If you divide E = IR by I, you obtain E/I = R.

If you divide E = IR by R, you obtain E/R = I.

Do you have trouble trying to decide what to divide by?

(a) Yes, I'd like some help Turn to page 79 (Book I)

(b) No, I just goofed. Let's try another Turn to page 225

Your answer was (b) No, I just goofed. Let's try another. O.K.

I bet you make it this time.

Is a/b = c equivalent to the statement a/c = b?

(a) Yes Turn to page 140

(b) No Turn to page 148

Your answer was either (a) 15, (b) 5, or (c) 3.
Incorrect!

Be careful! Sometimes we can divide to obtain the equivalent statement we want. However, sometimes we must multiply to obtain the equivalent statement we want.

What do you divide 15/3 = 5 by to obtain the equivalent statement 15 = 3 x 5?

(a) 3 Turn to page 92 (Book I)

(b) none of above Turn to page 54 (Book I)

Your answer was (a) 1/5 = 1 or (b) 5/1 = 1. No!

I guess I'm just not explaining things very well today. Go tell your human teacher where you are having difficulty. Then return to page 48 (Book I).

Your answer was (a) more review please.

I guess I'm just not explaining things very well today. Go tell your human teacher where you are having difficulty. Then return to page 48 (Book I).

Your answer was 6 = 14/7 x 3. Correct!

You recognized that 14/7 = 2 so 6 = 2 x 3 is equivalent to 6 = 14/7 x 3.

Which of the following equations is equivalent to a = b . c/c? (Remember that letters just stand for numbers.)

(a) a = bc Turn to page 200

(b) a = b Turn to page 189

(c) I am not sure what the question means Turn to page 207

Your answer was (b) 3 x 5/5 = 3. Correct!

You recognized that 5/5 = 1. Therefore, 3 x 5/5 = 3 is equivalent to 3 = 3.

Which of the following equations is equivalent to a = b . c/c? (Remember that letters just stand for numbers.)

(a) a = bc Turn to page 200

(b) a = b Turn to page 189

(c) I am not sure what the question means Turn to page 207

NORTHWEST REGIONAL EDUCATIONAL LABORATORY
400 Lindsay Building - 710 S.W. Second Avenue
Portland, Oregon 97204

CAI MATHEMATICS

TEST QUESTIONS

UNIT 13 - EQUIVALENT FORMS OF a = bc
Form A

1. Is 6·2·3 a correct equation?

   (a) Yes

   (b) No

2. Is $\frac{E \times R}{E}$ equivalent to E?

   (a) Yes

   (b) No

3. How do you obtain the equivalent statement 12 = 12 from the original statement $12 \cdot \frac{3}{3} = 12$?

   (a) Divide the original statement by 3

   (b) Multiply the original statement by 3

   (c) Use replacement and the fact that $\frac{3}{3} = 1$

4. Is a·b·c·d a correct equation?

   (a) Yes

   (b) No

5. Is $\frac{12}{4} = 3$ equivalent to $12 = 4 \times 3$?

   (a) Yes

   (b) No

6. How do you obtain the equivalent statement $\frac{18}{3} = 6$ from the original statement $18 = 3 \times 6$?

   (a) Multiply by 3

   (b) Multiply by 6

   (c) Divide by 3

   (d) Divide by 6

7. Is $10 = 2 \cdot 5$ a correct equation?

   (a) Yes

   (b) No

8. Is $I = \frac{E}{R}$ equivalent to $E = IR$?

   (a) Yes

   (b) No

9. The statement $a = bc$ is obtained from the statement $\frac{a}{c} = b$ by:

   (a) Multiplying by b

   (b) Multiplying by c

   (c) Dividing by b

   (d) Dividing by c

10. Is $\frac{21}{3} = 7$ a correct equation?

    (a) Yes

    (b) No

11. Is $\frac{14}{7} = 2$ equivalent to $14 = 2 \times 7$?

    (a) Yes

    (b) No

12. The statement $\frac{x}{y} = w$ is obtained from $x = wy$ by:

(a) Dividing by y

(b) Dividing by x

(c) Multiplying by w

(d) Multiplying by y

13. Is $\frac{99}{99} = 1$ a correct equation?

(a) Yes

(b) No

14. Is $W = PI$ equivalent to $P = \frac{I}{W}$?

(a) Yes

(b) No

15. The statement $I = \frac{E}{R}$ is obtained from $R = \frac{E}{I}$ by:

(a) Multiplying by I

(b) Dividing by R

(c) Multiplying by R

(d) Both a and b

16. Is $8 \times 4 = 12$ a correct equation?

(a) Yes

(b) No

17. An equivalent form of 2 is

(a) 1/2

(b) 4

(c) 4/2

18. How can you get A = MF from F = MA?

(a) Divide by A

(b) Multiply by M

(c) Both (a) and (b)

(d) You do not get A = MF from F = MA.

19. The quantity 3·7·K is a correct equation.

(a) True

(b) False

20. Using equivalent forms we can say that 12 = 2·2·3

(a) True

(b) False

21. How would you get $\frac{8}{4} = 2$ from 8 = 2 x 4?

(a) Divide by 2

(b) Divide by 4

(c) Multiply by 2

(d) Multiply by 4

22. The statement X = 9 x 2 is an equation.

(a) True

(b) False

23. Using equivalent forms we can say that $8 \times \frac{4}{4} \times \frac{3}{3} = 24$.

(a) True

(b) False

24. If A = BC, we can get B = $\frac{A}{C}$ by:

(a) Dividing by A

(b) Dividing by B

(c) Dividing by C

25. Which of the following is a correct equation?

(a) 3·2·4

(b) 4·6·1 = 24

(c) M·N·7

(d) 12 = 3·9

Answer Sheet - Unit 13

Equivalent Forms of a = bc
Form A

1. b
2. b
3. c
4. b
5. a
6. c
7. a
8. a
9. b
10. a
11. a
12. a
13. a
14. b
15. d
16. b
17. c
18. d
19. b
20. a
21. b
22. a
23. b
24. c
25. b

Objective 1 -- 1, 4, 7, 10, 13, 16, 19, 22, 25

Objective 2 -- 2, 5, 8, 11, 14, 17, 20, 23

Objective 3 -- 3, 6, 9, 12, 15, 18, 21, 24

NORTHWEST REGIONAL EDUCATIONAL LABORATORY
400 Lindsay Building - 710 S.W. Second Avenue
Portland, Oregon 97204

CAI MATHEMATICS

TEST QUESTIONS

UNIT 13 - EQUIVALENT FORMS OF a = bc
Form B

1. Is $4 \cdot 3 \cdot 1$ a correct equation?

   (a) Yes

   (b) No

2. Is $\frac{E \times R}{E}$ equivalent to R?

   (a) Yes

   (b) No

3. How do you obtain the equivalent statement $7 = 7$ from the original statement $7 = \frac{3}{3} \cdot 7$?

   (a) Divide the original statement by 3

   (b) Multiply the original statement by 3

   (c) Use replacement and the fact that $\frac{3}{3} = 1$

4. Is $a \cdot b \cdot c \cdot d$ a correct equation?

   (a) Yes

   (b) No

5. Is $\frac{6}{2} = 3$ equivalent to $\frac{10}{2} = 5$?

   (a) Yes

   (b) No

6. How do you obtain the equivalent statement $18 = 3 \times 6$ from the original statement $\frac{18}{3} = 6$?

(a) Multiply by 3

(b) Multiply by 6

(c) Divide by 3

(d) Divide by 6

7. Is $5 \cdot 2 = 10$ a correct equation?

(a) Yes

(b) No

8. Is $I = \frac{E}{R}$ equivalent to $IR = E$?

(a) Yes

(b) No

9. The statement $c = ab$ is obtained from the statement $\frac{c}{b} = a$ by:

(a) Multiplying by b

(b) Multiplying by c

(c) Dividing by b

(d) Dividing by c

10. Is $\frac{21}{7} = 3$ a correct equation?

(a) Yes

(b) No

11. Is $28 = 7 \times 4$ equivalent to $\frac{28}{7} = 4$?

(a) Yes

(b) No

12. The statement $w = \frac{y}{x}$ is obtained from $wx = y$ by:

(a) Dividing by y

(b) Dividing by x

(c) Multiplying by w

(d) Multiplying by y

13. Is $\frac{87}{87} = 1$ a correct equation?

(a) Yes

(b) No

14. Is PI = W equivalent to WI = P?

(a) Yes

(b) No

15. The statement $R = \frac{E}{I}$ is obtained from $I = \frac{E}{R}$ by:

(a) Multiplying by R

(b) Dividing by I

(c) Multiplying by I

(d) Both (a) and (b)

16. Is $12 = 8 \times 4$ a correct equation?

(a) Yes

(b) No

17. An equivalent form of 5 is

(a) 1/5

(b) 10

(c) 10/2

18. How can you get $I = ER$ from $E = IR$?

(a) Divide by I

(b) Multiply by E

(c) Both (a) and (b)

(d) You do not get $I = ER$ from $E = IR$.

19. The quantity $2 \cdot 8 \cdot R$ is a correct equation.

(a) True

(b) False

20. Using equivalent forms we can say that $18 = 3 \cdot 3 \cdot 2$.

(a) True

(b) False

21. How would you get $8 = 2 \times 4$ from $\frac{8}{4} = 2$?

(a) Divide by 2

(b) Divide by 4

(c) Multiply by 2

(d) Multiply by 4

22. The statement $F = 4 \cdot 7$ is an equation.

(a) True

(b) False

23. Using equivalent forms we can say that $6 \times \frac{2}{2} \times \frac{3}{3} = 6$.

(a) True

(b) False

24. If B = A/C we can get A = BC by:

(a) Multiplying by A

(b) Multiplying by B

(c) Multiplying by C

25. Which of the following is a correct equation?

(a) 2·6·5

(b) 8·2·1 = 16

(c) L·M·5

(d) 18 = 5·3

Answer Sheet - Unit 13

Equivalent Forms of a = bc
Form B

1. b
2. a
3. c
4. b
5. b
6. a
7. a
8. a
9. a
10. a
11. a
12. b
13. a
14. b
15. d
16. b
17. c
18. d
19. b
20. a
21. d
22. a
23. a
24. c
25. b

Objective 1 -- 1, 4, 7, 10, 13, 16, 19, 22, 25

Objective 2 -- 2, 5, 8, 11, 14, 17, 20, 23

Objective 3 -- 3, 6, 9, 12, 15, 18, 21, 24